Alg. 2 Warm Up # 5-5

1. Solve for x.

a) $\log_4(x + 3) = 2$

b) $\log_2(x - 5) + 6 = 9$

2. Use the zero product property to find the x-intercepts and then complete the square to write in vertex form. State the vertex.

$y = x^2 + 4x - 12$

HW Questions:

6-36. Verify that $2^7 = 128$. Is it true that $\log 2^7 = \log 128$?

6-37. If $24 = y$, is it true that $\log 24 = \log y$? Justify your answer.

If $2^x = 2^5$, $x = 5$ } the base is the same, so exponents are =

Use the same reasoning:

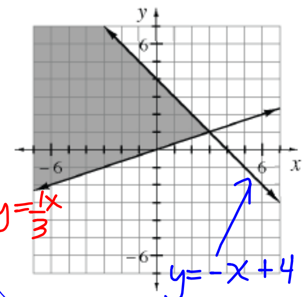
Since $24 = y$

$\log_{10} 24 = \log_{10} y$ ← both base 10 so =

6-38. Write the system of inequalities that would give the graph at right.

$y \ge \frac{1}{3}x$

$y \le -x+4$



6-39. Simplify each of the following expressions.

a. $\frac{2x^3+5x^2-3x}{4x^3-4x^2+x} = \frac{\cancel{x}(2x^2+5x-3)}{\cancel{x}(4x^2-4x+1)}$ $\frac{(\cancel{2x-1})(x+3)}{(\cancel{2x-1})(2x-1)}$

b. $\frac{3x^2-5x-2}{2x^2-11x+15} \cdot \frac{2x^2-5x}{3x^3-5x^2-2x}$

$$\frac{(3x+1)(x-2)}{(\cancel{2x-5})(x-3)} \cdot \frac{\cancel{x}(\cancel{2x-5})}{\cancel{x}(3x^2-5x-2)}$$

$$\frac{(\cancel{3x+1})(\cancel{x-2})}{(x-3)(\cancel{3x+1})(\cancel{x-2})}$$

$$\boxed{\frac{1}{x-3}}$$

6-40. Solve $\sqrt{3x+1}-x=-3$ and check your solution.

a. You should have gotten two values for x when you solved. Did you? If not, rework the problem.

b. Did you check *both* solutions? What happened?

$$\left(\sqrt{3x+1}\right)^2=(x-3)^2$$

$$3x+1=x^2-6x+9$$

$$0=x^2-9x+8$$

$$(x-1)(x-8)$$

$$x=1,8$$

$$\boxed{x=8}$$

Check

$$\sqrt{3(1)+1}-(1)\overset{?}{=}-3$$

$$2-1=$$

$$1\neq-3$$

January 19, 2018

6-41. Solve each of the following equations.

a. $(x+4)(2x-5)=0$

b. $(x+4)(x^2-5x+6)=0$

c. $3x(x+1)(2x-7)(3x+4)^2(x-13)(x+7)=0$

d. Describe how to solve an equation made up of any number of factors all multiplied to equal zero.

Use the zero product property.
Set each factor $=0$, then solve.

6-43. Solve for x, y, and z: $\boxed{(2^x)}(3^y)(5^z) = \boxed{(2^3)}(3^{x-2})(5^{2x-3y})$.

$2^x = 2^3$

$\boxed{x=3}$

$3^y = 3^{x-2}$

$y = x-2$

$y = 3-2$

$\boxed{y=1}$

. . . Now find z.

CP's: #16 ---> 20

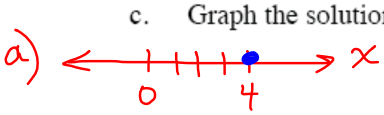
6-20. Consider the graph of $x=4$ for each of the following problems.

a. Graph the solution to $x=4$ in one dimension (on a number line).

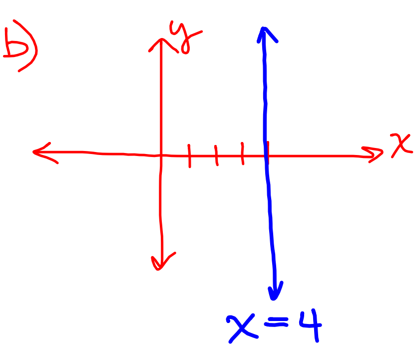
b. Graph the solutions to $x=4$ in two dimensions (on the xy-plane).

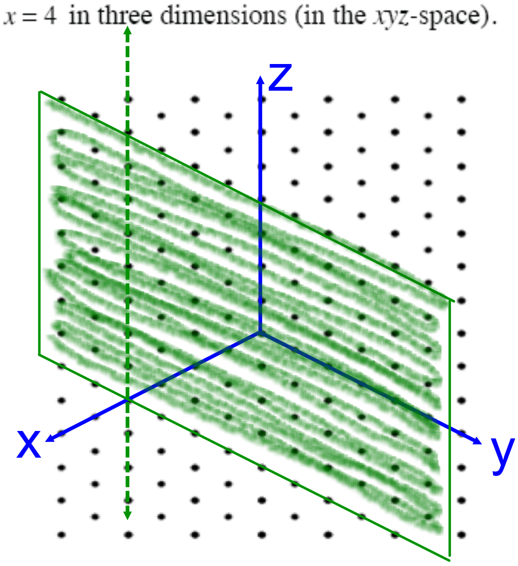
c. Graph the solutions to $x=4$ in three dimensions (in the xyz-space).

a)



b)





CP's: 6- # 31 ---> 33, 35

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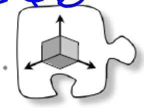
6.1.3 What can I discover about 3-D systems?



Systems of Three-Variable Equations

You know a lot about systems of two-variable equations, their solutions, and their graphs. Today you will investigate systems of three-variable equations.

Discuss as a class:

6-30. THREE-DIMENSIONAL SYSTEM INVESTIGATION

Consider the following systems of equations:

System I	*System II*
$20x+12y+15z=60$	$20x+15y+12z=60$
$20x+12y+15z=120$	$10x+30y+12z=60$

Your Task: With your team, find out as much as you can about each of these systems of equations, their graphs, and their solutions. Be sure to record all of your work carefully and be prepared to share your summary statements with the class.

Discussion Points

What does the graph of a three-variable equation look like? a plane

What does it mean to be a solution to a system of equations?

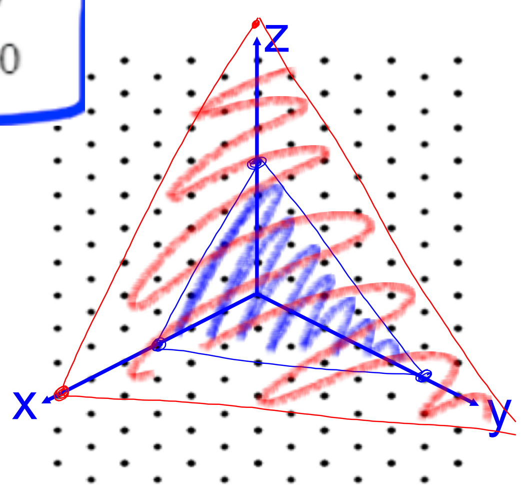
What does a solution to a three-variable system of equations look like on a graph?

Is there always a solution to a system of equations?

31.

System I

1. $20x+12y+15z=60$
2. $20x+12y+15z=120$



① (3, 0, 0)
(0, 5, 0)
(0, 0, 4)

② (6, 0, 0)
(0, 10, 0)
(0, 0, 8)

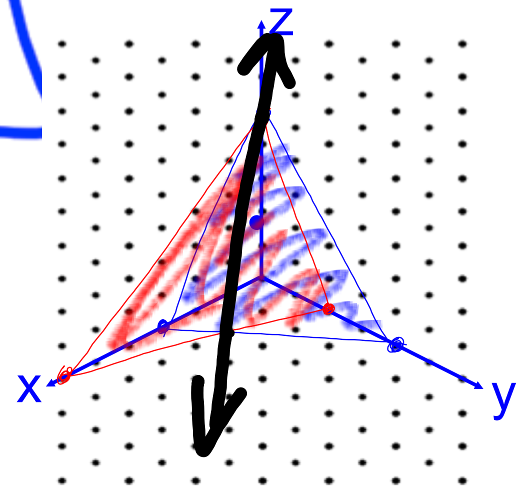
32. *System II*

① $20x+15y+12z=60$

$10x+30y+12z=60$

① (3,0,0) (0,4,0) (0,0,5)

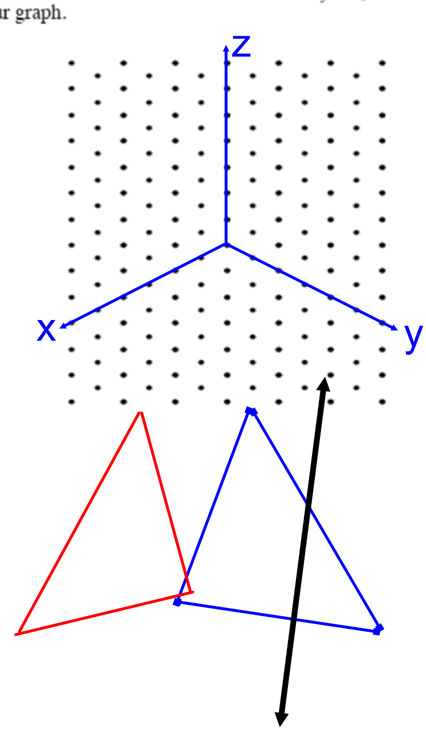
② (6,0,0) (0,2,0) (0,0,5)



-35. On isometric dot paper, graph the system of equations at right. What shape is the intersection? Use color to show the intersection clearly on your graph.

$10x+6y+5z=30$

$6x+15y+5z=30$

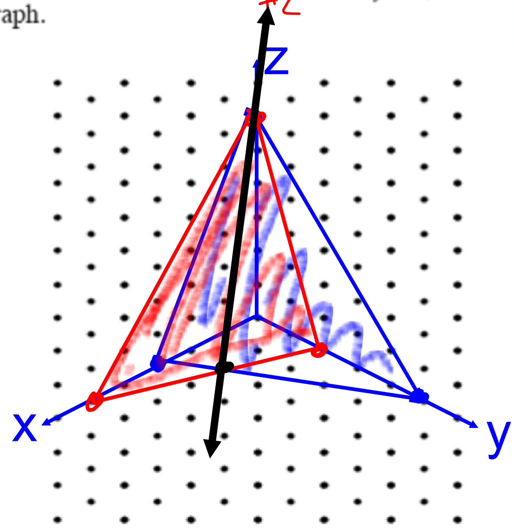


6-35. On isometric dot paper, graph the system of equations at right. What shape is the intersection? Use color to show the intersection clearly on your graph.

#1 $10x + 6y + 5z = 30$
#2 $6x + 15y + 5z = 30$

#1
x-int: (3, 0, 0)
y-int: (0, 5, 0)
z-int: (0, 0, 6)

#2
(5, 0, 0)
(0, 2, 0)
(0, 0, 6)



Week 5 Classwork

Warm up on top

CP's: 6- #1 ---> 6 (green)

CP's: 6- # 16 ---> 20

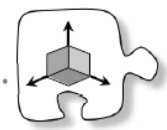
(with iso paper: #18, 19ab, 20c)

CP's: 6- # 31 ---> 33, 35

(with iso paper: # 31, 32, 35)

CP's: 6- #44 ---> 48

6.1.4 What is a solution in three dimensions?



Solving Systems of Three Equations with Three Unknowns

Today you will extend what you know about systems of equations to examine how to solve systems of equations with three variables. As you work with your team, look for connections to previous work. The focus questions below can help generate mathematical discussion.

What does a solution to a system in three variables mean?

What strategies can we use?

What does the intersection look like?

6-44. Review the strategies for solving systems that you already know as you solve the following two-variable system of equations. Use any method. Do not hesitate to change strategies if your first strategy seems cumbersome. If there is no solution, explain what that indicates about the graph of this system. Leave your solution in (x, y) form.

$$12x - 2y = 16$$
$$30x + 2y = 68$$

Equal Values
Elimination
Substitution

6-45. Solve the following three-variable system of equations by graphing it with your graphing tool or on isometric dot paper. Give your solution in (x, y, z) form. Then test your solution in the equations and describe your results.

$$2x + 3y + 3z = 6$$
$$6x - 3y + 4z = 12$$
$$2x - 3y + 2z = 6$$

6-46. FINDING AN EASIER WAY

As you saw in problem 6-45, using a graph to solve a system of three equations with three variables can lead to inconclusive results. What other strategies should be considered? Discuss this with your team and be prepared to share your ideas with the class.

6-47. Looking at the equations in problem 6-45, Elissa wanted to see if she could apply some of her solving techniques from two-variable equations to this three-variable system.

a. Elissa noticed that the first two equations could be combined to form the new equation $8x + 7z = 18$. How did she accomplish this? Explain.

b. Now that Elissa has an equation with only x and z, she needs to find another equation with only x and z to be able to solve the system. Choose a different pair of equations to combine and find a way to eliminate y so that the new equation only has x and z. Then solve the system to find x and z.

c. For which variable do you still need to solve? Work with your team to solve for this variable. Then write the solution as a point in (x, y, z) form.

d. Is your solution reasonable? Does it make sense? Does it agree with your graph?

6-48. Practice using your algebraic strategies by solving the systems below, if possible. If there is no solution or if the solution is different than you expected, use the graphing tool to help you figure out why.

a. $$\begin{aligned} x + y + 3z &= 3 \\ 2x + y + 6z &= 2 \\ 2x - y + 3z &= -7 \end{aligned}$$

b. $$\begin{aligned} 20x + 12y + 15z &= 60 \\ 20x + 12y + 15z &= 120 \\ 10x + 20z &= 30 \end{aligned}$$

c. $$\begin{aligned} 5x - 4y - 6z &= -19 \\ -2x + 2y + z &= 5 \\ 3x - 6y - 5z &= -16 \end{aligned}$$

d. $$\begin{aligned} 6x + 4y + z &= 12 \\ 6x + 4y + 2z &= 12 \\ 6x + 4y + 3z &= 12 \end{aligned}$$

HW: 6-

#51 ---> 59